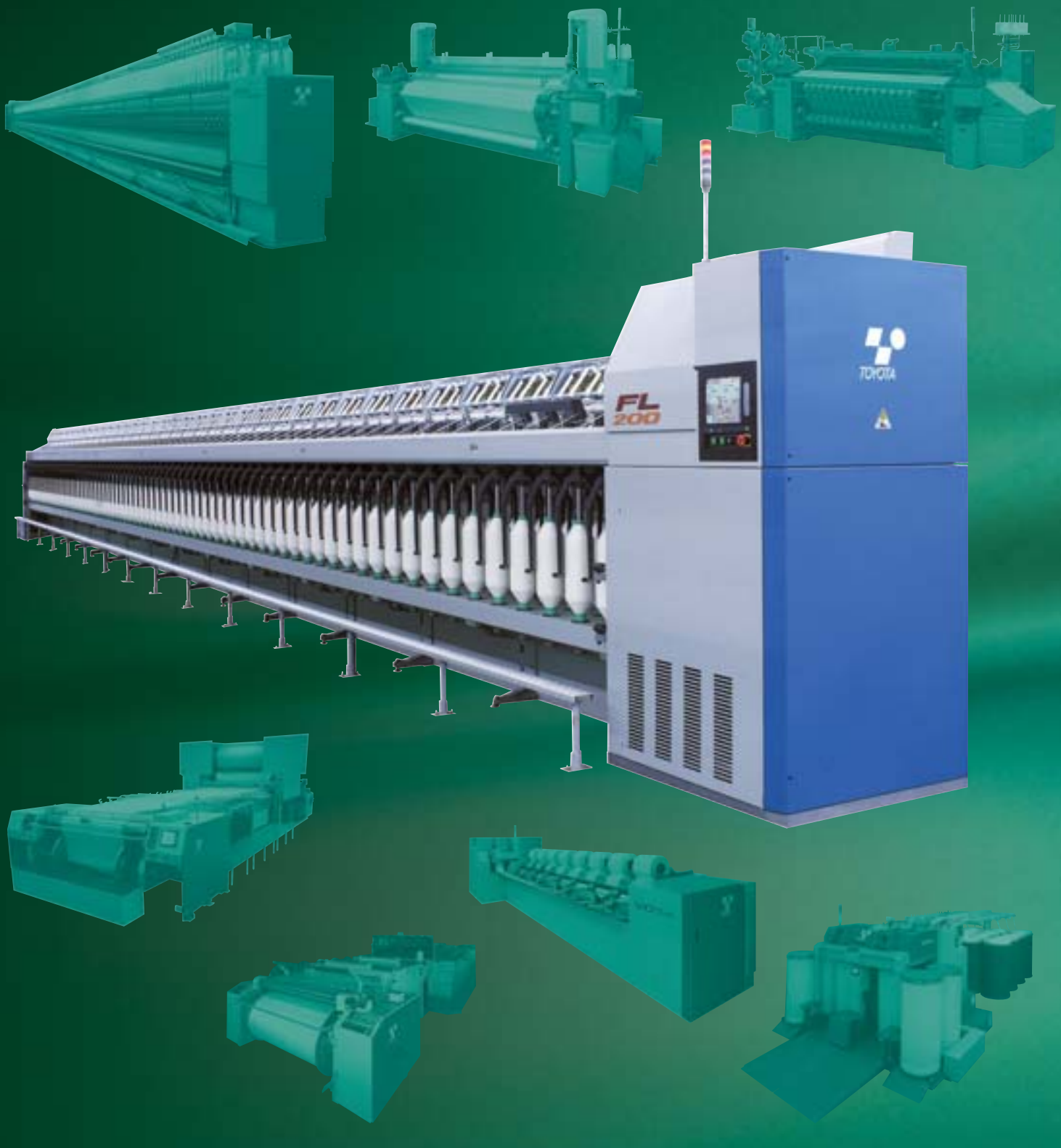
TOYOTA

# Roving Frame FL 200



# The Convergence of Advanced Technology and Tradition

The new FL200 was born out of Toyota's unending pursuit of the ideal roving frame, one that enables anyone to spin high-quality roving at high speeds, the aim of the original FL100.

The three-motor drive established in the FL100 has evolved and developed into a four-motor drive, and the latest in servo technology and dramatically improved CPU performance provides even greater accuracy and control. New intelligent features have been added to the FL200, enabling the machine to "think for itself" and become a detail-oriented assistant facilitating the customer's operations. Combined with the synergy of a high-performance tension controller, the FL200 guarantees our customers a roving process one rank above all others in every aspect of performance, including productivity, operability, and roving quality.

## *Newly Developed Four-Motor Drive*

- **Main motor drives flyers**
- **Draft motor drives bottom rollers**
- **Winding motor drives bobbins**
- **Lifting motor drives bobbin rail**

# *Roving Frame* FL 200

10.5-inch color function panel

# Outstanding Productivity

# FL200
## *Roving Frame*

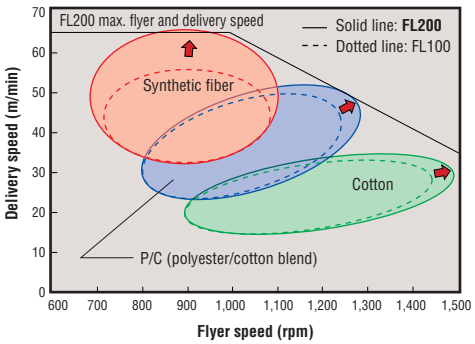
## High-speed flyer

To maintain optimum output quality in high-speed operation, the FL200 uses a flyer designed especially for high-speed performance. An internal stainless steel tubular roving guide connecting directly to the presser protects against the adverse effects of air turbulence, dust, and fly in high-speed production. As a result, the FL200 operates dependably at speeds up to 1,500 rpm.

## Automatic flyer speed control device with inverter

By simply inputting the average flyer speed and basic roving conditions such as fiber length and roving count, the computer automatically establishes the correct speed progression pattern and adjusts flyer speed via inverter to maintain a constant centrifugal force on the roving. This results in reduced roving breakage for improved efficiency and ease of operation.

### Productivity

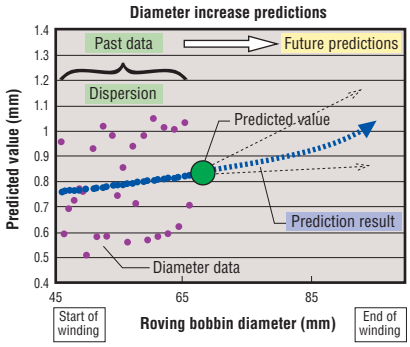



## Advanced control system ensures simple, easy production of optimal packages

A test run is normally required when roving new yarn types and yarn counts to determine the amount of increase in the bobbin diameter and input to the roving frame. The FL200 has completely eliminated this troublesome operation: in addition to an automatic calculation function for bobbin diameter increase based on the database inherited from the FL100, we have added a new control feature that successively predicts and corrects the actual amount of increase in bobbin diameter based on continuously accumulated operational data. As a result, actual conditions can be determined with greater accuracy, consistently providing the optimum package size with the optimal tension without the need to do a roving test. In addition, the database itself is automatically updated based on actual operation. The more this learning function is used, the greater the consistency in the roving packages.

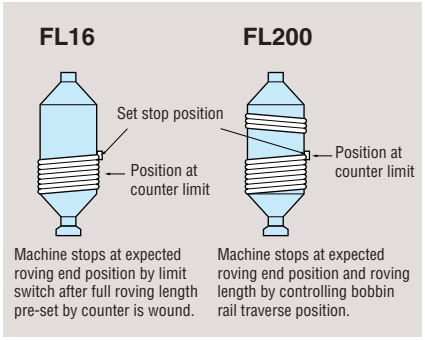
### Bobbin diameter increase predictions & actual results

(CD250gr/30yd NF:1,100rpm)




## Automatic stop at fixed roving length and position

The FL200's microcomputer control makes it possible to stop roving at both a fixed position and a specified length. The FL200 automatically returns to the set position once the length limit has been reached. Production yield improves because the length of the roving actually wound falls within ±1 meter of the specified length.



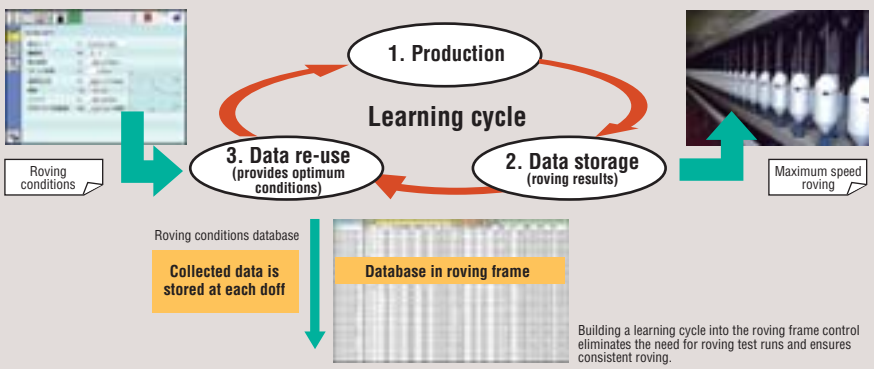

Machine stops at expected roving end position by limit switch after full roving length pre-set by counter is wound.

Machine stops at expected roving end position and roving length by controlling bobbin rail traverse position.

| Model \ Sliver type | Wasted roving | |
|---|---|---|
| | Carded Ne20 | Combed Ne40 |
| FL200 | 0.068% | 0.056% |
| FL16 | 1.35% | 1.34% |

### Package formation learning function

**Learning function eliminates roving test runs and ensures consistent roving packages.**

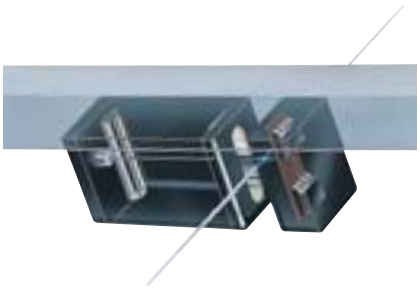



Building a learning cycle into the roving frame control eliminates the need for roving test runs and ensures consistent roving.

# High-Quality Roving

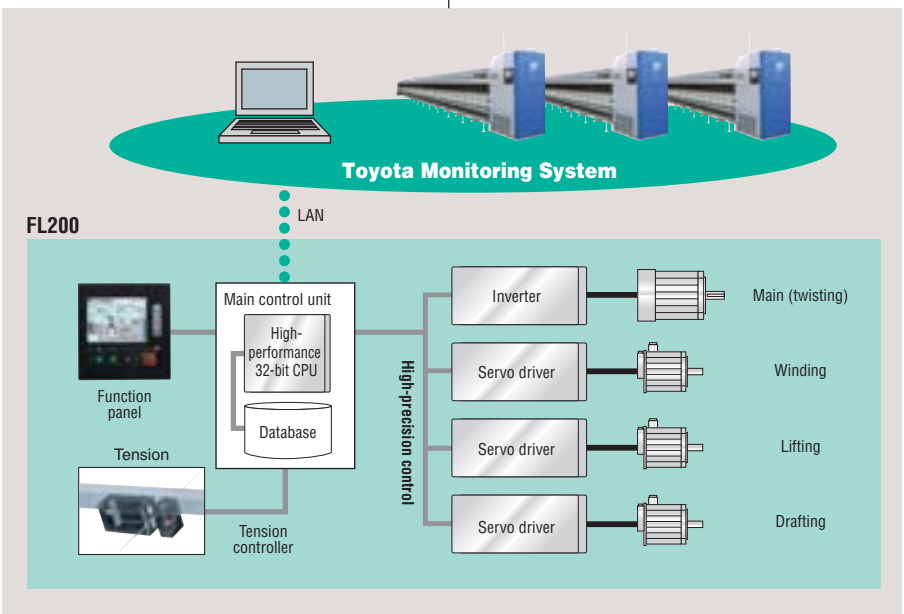
## High-performance sensors, a newly developed CPU, and the latest in servo technology deliver the ultimate in winding tension control

The combination of a microcomputer and CCD ‘electronic eye’ sensors accurate to the 0.1-mm level maintains ideal winding tension for even the finest count. This system also ensures uniform tension between all frames in a production group, a difficult feat with conventional manual adjustments.



In addition, the computer stores settings according to various criteria—flyer speed, fiber type, etc.—and automatically sets the appropriate tension, eliminating the need for frequent setup adjustments.

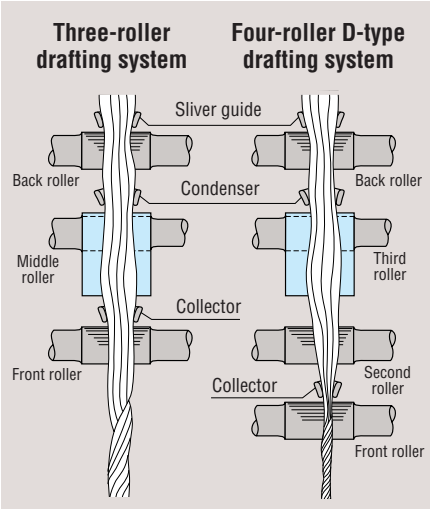
The merging of servo technology providing optimal control functions and the newly developed four-motor drive system into this high-performance tension controller delivers the ultimate in winding tension control.



# FL200
## *Roving Frame*

## Four-roller drafting system for smooth, soft roving

The FL200 is equipped with the four-roller drafting system proven effective and favorably evaluated by customers. This system places a collector between the front and second rollers, separating drafting and collecting zones for superior roving softness and smoothness.




## Creel tension fine adjustment mechanism

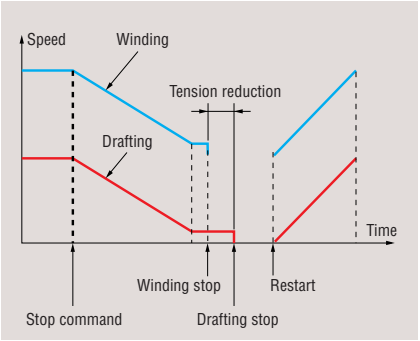
OPTION

When roving combed cotton, sliver is stretched slightly in feeding from can to drafting section. The degree of elongation and thus the evenness of the roving can vary somewhat depending on the relative can position. To overcome this variance, the FL200 offers an optional creel tension fine adjustment mechanism. By allowing operators to precisely control sliver tension at the feed rollers, this maintains uniform roving and a balanced rate of sliver draw from the feed cans.

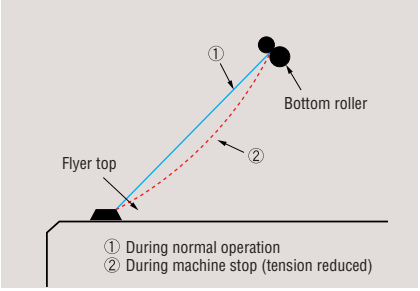
## Unique mechanism minimizes roving irregularities

Two separate motors are used to drive drafting and winding operations. This allows winding to be stopped slightly before drafting to provide some slack between front rollers and the flyer top. Thus, by preventing excessive tension at restart, there is no irregularity in roving even for synthetic fibers or coarse count.

### Winding and drafting speed




### Roving path between front roller and flyer top



# Simple Operation, High Reliability, and Easy Maintainability

## Large color function panel

A 10.5-inch, 2-language color function panel equipped with a Web browser improves interface ability. Connection to an internal or external network is possible for exchange of information or data, thereby expanding the capability of today's spinning mills.

### Function panel

**Setting functions**

- Spinning conditions • Roving bobbin formation
- Flyer speed control (automatic optimum pattern calculation, speed control pattern graph display)
- Stop sequence operation, etc.

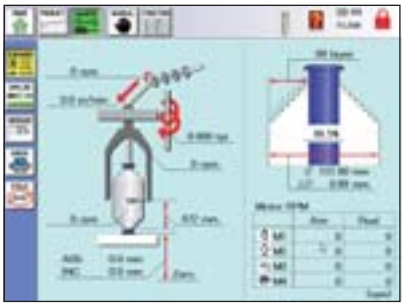
**Monitoring functions**

- Production volume (shift counter)
- Transition of efficiency for each shift NEW
- History of running conditions for the last 24 hours NEW
- Flyer speed, delivery speed, twists, and time to full bobbin
- Inverter/servo amplifier monitor NEW
- Troubleshooting, history NEW

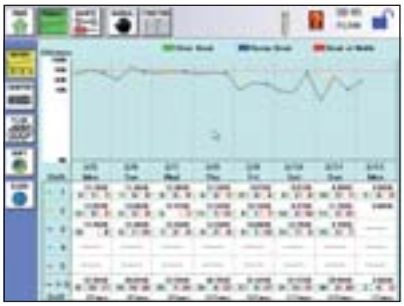
**Management functions**

- Setting condition memory function NEW
- Memory card NEW
- Maintenance schedule management function NEW

Color LCD touch-screen function panel simplifies input and monitoring



Running condition monitor



Shift report

Troubleshooting

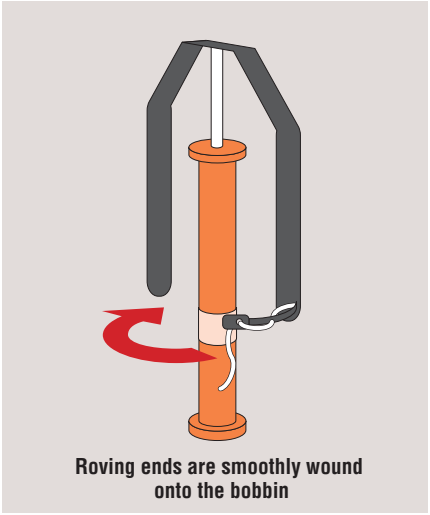
## TMS (Toyota Monitoring System) OPTION

Advanced mill management has never been easier. TMS, Toyota's original monitoring software, allows you to effectively conduct mill management—including maintenance—right from your office. Simply use a LAN cable to connect multiple Toyota machines to any commercially available PC in the office. That PC can then be used to easily access various kinds of information, such as shift reports, and to directly view the function panels of all connected machines for an accurate assessment of how the machines are operating. What's more, machine setting data can be transferred to another machine without using memory cards—a great way to save time and effort when changing yarn types.

# FL200
## *Roving Frame*

### Automatic roving-end positioning device for easy restarting

The need for manual procedures is further reduced through automatic roving-end attachment. When the bobbin rail is raised to the restart position after doffing and new bobbin insertion, the machine restarts in reverse at low speed for a certain period and then switches to normal rotation. Roving ends are automatically positioned and pressed tightly against the bobbins to begin winding.



**Roving ends are smoothly wound onto the bobbin**

### Bobbin collision prevention function

In conventional roving frames, an empty bobbin can occasionally be erroneously set at an angle and can thrust the spindle upwards after doffing, leading to damaged components. The FL200 employs an overload detection function on the servo motors used to raise and lower the bobbin rail to automatically sense this bobbin insertion fault and immediately stop lifting of the bobbin rail. This new mechanism prevents these kinds of accidents from happening.

### High-twist roving cutting function

An extra twist is applied locally prior to lowering the full bobbin in order to protect the area where the roving is easily cut. This enables the roving to be cut properly between the presser and the wound bobbin regardless of the type of fiber, enabling automatic doffing.

**Machine stop motion**

↓

**Flyers and bobbins rotate at the same speed without delivery (extra twist applied)**

↓

**Normal roving resumes, feeding extra twist section inside flyer**

↓

**Bobbin rail lowers (roving is cut between presser and bobbin)**

↓

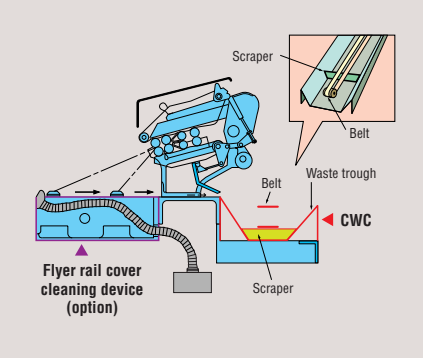
**Doffing**

### Synchronized back-up system for power failure

A back-up power system in the FL200 protects against all kinds of power supply fluctuations, including power failures, enabling the machine to stop while maintaining the synchronization between the spindles and the drafting rollers. In addition, the amount of time back-up power is provided during momentary interruptions to ensure continuous operation has been significantly increased.

### Energy-saving Clearer Waste Collector (CWC) prevents fly accumulation (pneuma-less type)

The CWC deposits bottom clearer fly into the waste trough, where a conveyor belt carries it to the waste container at the out end. The pneuma-less suction mechanism uses far less electricity and simplifies maintenance. The elimination of pneumatic noise and microscopic dust improves factory environment.




### Stop motion upon roving breakage OPTION

A breakage in the middle of the package during operation may cause stray cotton fiber ends to become wound onto adjacent bobbins, causing chain breaks and affecting quality. To prevent this, a phototube with a special circuit detects breakage and immediately stops the machine.

# FRD Stationary Doffer for Roving Frames

Toyota's FRD stationary doffer for roving frames has forks that simultaneously hang on the full bobbins and empty bobbins, thus dramatically reducing the stoppage time required during doffing. Downtime is 3.5 minutes, the shortest in the world. Because it's simply designed and independent of the roving frame, maintenance is easy. Toyota guarantees that the FRD will give stable doffing.

## Operation Sequence

①
Before doffing

②
Forks move forward

③
Forks grasp full bobbins

④
Forks simultaneously grasp full and empty bobbins

⑤
Empty bobbins are inserted

⑥
Setting of empty bobbins is completed

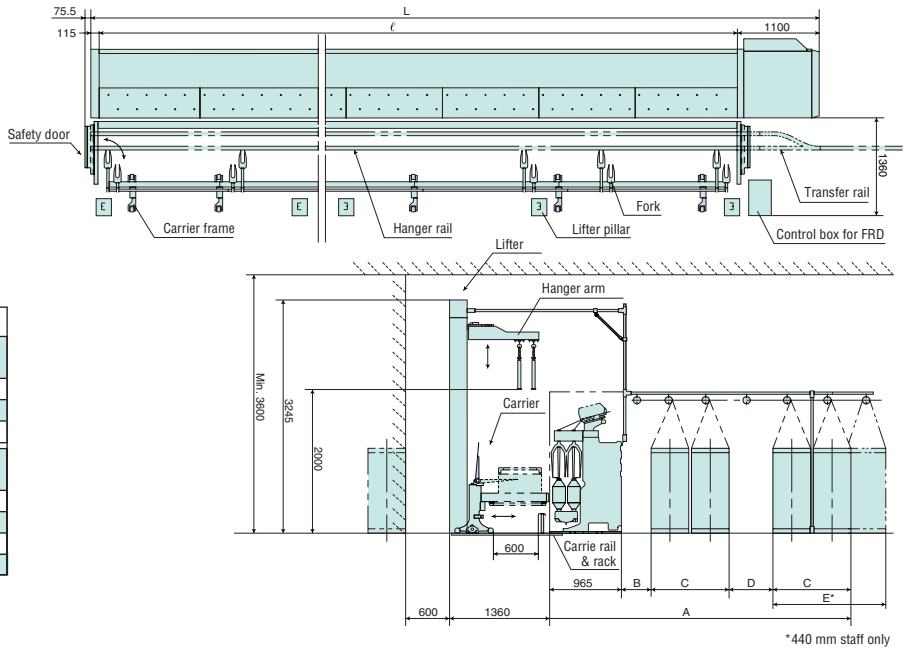
⑦
Preparing to raise full bobbins

⑧
Full bobbins are transfered to the ring spinning frame

**The shortest doffing machine stoppage time in the world**

**3.5 min.**

## Floor Plan




*440 mm staff only

| Dimensions / Number of spindles | Model FL200 (520 mm staff) ℓ | L (frame length) |
|---|---|---|
| 120 | 15,740 | 16,955 |
| 108 | 14,180 | 15,395 |
| 96 | 12,620 | 13,835 |
| Can diameter / Dimensions | 508 (20) | 508 (20) |
| A | 4,465 | 4,065 |
| B | 400 | 400 |
| C | 1,050 | 1,050 |
| D | 1,000 | 600 |

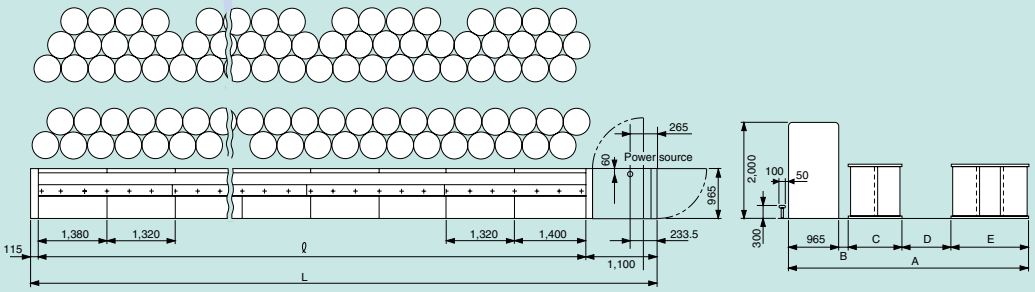
# Floor Plan

### Model FL200 (440 mm staff)

(Unit: mm)

| Number of spindles \ Dimensions | ℓ | L (frame length) |
|---|---|---|
| 144 | 15,980 | 17,195 |
| 132 | 14,660 | 15,875 |
| 120 | 13,340 | 14,555 |
| 108 | 12,020 | 13,235 |
| 96 | 10,700 | 11,915 |

| Dimensions \ Can diameter | 508 (20) | 508 (20) |
|---|---|---|
| A | 4,805 | 4,405 |
| B | 400 | 400 |
| C | 990 | 990 |
| D | 1,000 | 600 |
| E | 1,450 | 1,450 |
| Configuration | 5-row staggered | |




### Model FL200 (520 mm staff)

| Number of spindles \ Dimensions | ℓ | L (frame length) |
|---|---|---|
| 140 | 18,340 | 19,555 |
| 120 | 15,740 | 16,955 |
| 108 | 14,180 | 15,395 |
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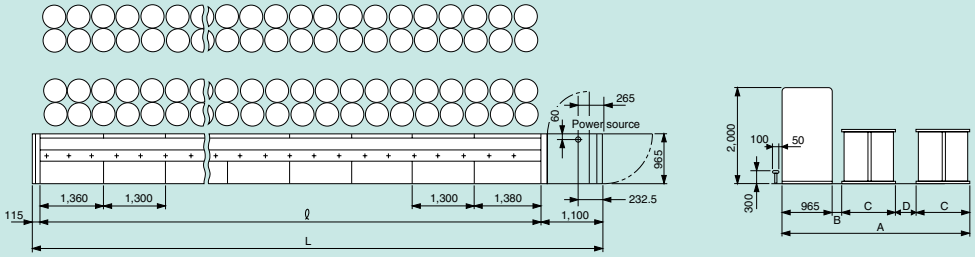
| Dimensions \ Can diameter | 508 (20) | 508 (20) |
|---|---|---|
| A | 4,465 | 4,065 |
| B | 400 | 400 |
| C | 1,050 | 1,050 |
| D | 1,000 | 600 |




Design and specifications are subject to change without prior notice.

# Main Specifications

(Unit: mm)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Staple length | | 22–40 mm | | 40–51 mm | | 51–76 mm | | 44–76 mm* | |
| Drafting system | | 4-roller (D type) | | 4-roller (D type) | | 3-roller | | 3-roller | |
| Weighting arm | Maker | Texparts | | Texparts | | Texparts | | Texparts | |
| | Type | PK 1500-001938 | | PK 1500-001938 | | PK 1500-02 | | PK 1500-02 | |
| Weight (kg/2 spindles) | F | 9–12–15 | | 9–12–15 | | 20–25–30 | | 20–25–30 | |
| | 2 | 15–20–25 | | 15–20–25 | | 10–15–20 | | 10–15–20 | |
| | 3 | 10–15–20 | | 10–15–20 | | 15–20–25 | | 15–20–25 | |
| | B | 10–15–20 | | 10–15–20 | | —— | | —— | |
| Cradle type | | OH514-110 | | OH534-110 | | OH524-110 | | OH534-110 | |
| Cradle radius x width (mm) | | 34.5 x 40 | | 45.0 x 40 | | 58.0 x 40 | | 45.0 x 40 | |
| Bottom roller diameter (mm) | F | 28.5 | | 28.5 | | 31.75 | | 31.75 | |
| | 2 | 28.5 | | 28.5 | | 28.5 (knurled) | | 28.5 (knurled) | |
| | 3 | 28.5 (knurled) | | 28.5 (knurled) | | 31.75 | | 31.75 | |
| | B | 28.5 | | 28.5 | | —— | | —— | |
| Top roller diameter (mm) | | 28 | | 28 | | 35 | | 35 | |
| Roller gauge (mm) | F–2 | 35– | Max.193 (total) | 42– | Max.193 (total) | 73– | Max.185 (total) | 62– | Max.185 (total) |
| | 2–3 | 4–7 | | 60– | | 57– | | 52– | |
| | 3–B | 45– | | 49– | | —— | | —— | |
| Clearer | | Positive intermittent revolving clearer with comb | | | | | | | |
| Feeding can | | Up to 508 mm (20") diameter x 1,150 mm (45") high | | | | | | | |
| Creel | | Positive revolving feed roller with extended creel (single sliver feed system) | | | | | | | |
| Power required | | Main motor: 15kW | | | | | | | |
| Special devices (included) | High speed | Automatic flyer speed control with inverter | | | | | | | New SL Flyer |
| | Quality | Automatic tension controller, roving irregularity prevention, roving stop at set length/position, package shoulder collapse prevention, optical electronic roving stop motion, optical electronic sliver stop motion | | | | | | | |
| | Operation and maintenance | 10.5-inch color function panel, bobbin misplacement prevention device, oil bath lubrication for main gearing, automatic grease lubrication for draft gearing, automatic grease supply system for flyer gear, clearer waste collector (pneuma-less type) | | | | | | | |
| | Automation | Automatic roving-end positioning for machine restart, high-twist roving cutting device | | | | | | | |
| Options | High speed | Bobbin jumping prevention device | | | | | | | |
| | Quality | Stop motion upon roving breakage at middle part of package, creel tension fine adjustment mechanism | | | | | | | |
| | Operation and maintenance | Flyer-rail cover cleaning device, automatic travelling suction cleaner | | | | | | | |

* Cradles for 51 to 76 mm length fiber must be ordered separately.

# GLOBAL SERVICE NETWORK

## Total worldwide customer service

Toyota offers a full range of services, from plant layout consulting to machinery installation and after-sales service. The Toyota Textile Machinery Training Center provides a variety of training courses which precisely match the needs and abilities of individual customers. Toyota also helps train customers' technical engineers from around the world.

### 1. Plant layout
Before the delivery of machinery, Toyota proposes an installation layout which is designed to optimally suit a customer's plant.

### 2. Installation
A Toyota expert supervises installation and instructs customers on machine operation.

### 3. Customer support service
A variety of customer support services are provided, such as supplying spare parts to ensure continuous and smooth operation.

### 4. Training
Toyota provides a wide range of courses from handling Toyota machinery to management. These substantial courses help customers obtain a level of expertise in both the mechanical knowledge and efficient usage of machinery.

### 5. Service network
With service centers located around the world, Toyota is able to quickly respond to the needs of local customers.

**Global service centers**

1. Korea 2. China (Shanghai, Shaoxing, Wujiang, Jinan, Changzhou)
3. Taiwan 4. Thailand 5. Indonesia 6. India 7. Pakistan 8. Turkey
9. Europe (Italy, France, Switzerland) 10. U.S.A. 11. Brazil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